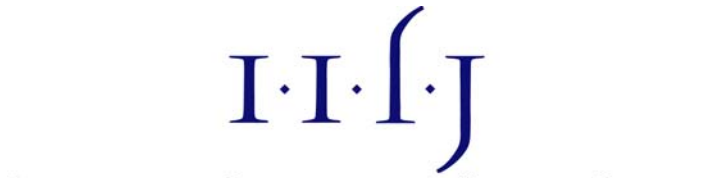

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BUILDING BLOCKS FOR GLOBAL CLIMATE PROTECTION

RICHARD B. STEWART, MICHAEL OPPENHEIMER,
AND BRYCE RUDYK

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Institute for International Law and Justice
139 MacDougal Street, 3rd Floor
New York, NY 10012
Website: www.iilj.org

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New York University School of Law
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Building Blocks for Global Climate Protection
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Richard B. Stewart, Michael Oppenheimer, and Bryce Rudyk[1]

Abstract:

The paper presents an innovative institutional strategy for global climate protection, quite distinct from, but ultimately complementary to the stalled UNFCCC climate treaty negotiations. The building blocks strategy relies on a variety of smaller-scale transnational cooperative arrangements, involving not only states but sub-national jurisdictions, firms, and NGOs, to undertake activities whose primary goal is not climate mitigation but which will achieve greenhouse gas reductions as an inherent byproduct. This strategy avoids the inherent problems in securing an enforceable treaty to secure the global public good of climate protection by mobilizing other incentives — including economic self-interest, energy security, cleaner air, and furtherance of international development — to motivate such actors to cooperate on actions that will also benefit the climate. The paper outlines three specific models of regime formation (club, linkage and dominant actor models) which draws on economics, international relations, and organizational behavior to create transnational regimes that are generally self-enforcing and sustainable, avoiding the free rider and compliance problems that are endemic in a climate treaty. These regimes will contribute to global climate action not only by achieving emissions reductions in the short-term, but also by creating global webs of cooperation and trust, and by linking the building block regimes to the UNFCCC system through greenhouse gas monitoring and reporting systems. In these ways, the building blocks regimes will help secure eventual agreement on a global climate treaty.

[1] University Professor, John Sexton Professor of Law, New York University School of Law; Albert G. Milbank Professor of Geosciences and International Affairs, Woodrow Wilson School of Public and International Affairs and Department of Geosciences, Princeton University, and Visiting Professor, NYU School of Law; Executive Director, Frank J. Guarini Center for Environmental and Land Use Law and Adjunct Professor of Law, NYU School of Law, respectively. The authors gratefully acknowledge the superb assistance of Rachel Goodwin, Nadia Harrison, and John Mei. Thanks also to Scott Barrett for stimulating this effort to find a fresh approach to solving the climate collective action challenge and to David Victor, Dan Cole, Rob Howse, Bob Keohane, Jake Werksman, Michael Livermore, Jessica Green, Maria Damon, Chris Faris, and Annie Petsonk for helpful insights.

Introduction: Addressing the Limitations of the UNFCCC through a Building Block Approach

This article presents an innovative institutional approach to supplement and ultimately strengthen the lagging United Nations Framework Convention on Climate Change (UNFCCC) process for negotiating a climate treaty that commits major emitting and developed countries to greenhouse gas emissions limitations. The Durban Platform for Enhanced Action does not aim to have such a treaty before 2020, and there remain very serious obstacles to reaching such an agreement even then. In the interim, the only international global climate regulation in force is a substantially weakened Kyoto Protocol. This creates the need and the opportunity for initiating smaller scale and less centralized forms of transnational cooperation for climate protection. This article articulates three distinct institutional strategies to create a variety of discrete, specialized regimes that will produce reductions in greenhouse gas emissions—a building block approach to climate protection.[2]

The several different building block regimes would involve participation by a limited number of governments, subnational jurisdictions, firms, and NGOs. They would coordinate and support specific transnational regulatory, research and development, and financial programs in discrete economic or development sectors or in geographic regions. To enlist participation, these regimes would primarily pursue non-climate objectives that provide economic or other non-climate benefits to the regime members. At the same time, the regimes would be designed so that members' activities would reduce greenhouse gas emissions. The approach provides incentives for actors to advance their respective interests in ways that would also produce a global public benefit.

The building block approach seeks to advance climate protection by focusing on multiple discrete regimes with a variety of objectives; by limiting the number of participants and at the same time including non-state actors; by focusing on discrete types of activities that provide direct benefits to participants; and by using different modes of governance and representation of interests than those afforded by international law. Through these means, the building block approach reconceptualizes, enriches, and energizes the current global climate regime complex.[3] The approach consists of three basic institutional strategies for building transnational cooperation:

Club Strategy: This strategy focuses on creating transnational regimes that produce economic or other non-climate benefits either exclusively or primarily for the regime participants. These targeted non-climate benefits include reduced energy costs, energy security, research and development, and competitive advantage. The structure of these regimes would be designed in accordance with the economic concept of clubs.[4] Clubs represent a class of cooperation game, based on generating club benefits that are limited entirely or primarily to those that participate in the club and abide by its terms. This type of cooperation game is wholly different from that involved in securing a climate treaty aimed at securing a global public good.[5] Like all public good cooperation games, broadly inclusive international treaties must deal with pervasive incentives to free ride on the efforts of others by either not joining a cooperative arrangement or not abiding by its terms. The club approach, by contrast, targets discrete benefits to club members, giving incentives to join. Clubs, however, must include

[2] In this article we do not consider the possibility that the building block strategies might be also used to promote adaptation to climate change.
[3] *See* Robert O. Keohane & David G. Victor, *The Regime Complex for Climate Change*, 9 PERSP. ON POL. 7 (2011).
[4] *See* James M. Buchanan, *An Economic Theory of Clubs*, 32 ECONOMICA 1 (1965).
[5] SCOTT BARRETT, ENVIRONMENT AND STATECRAFT THE STRATEGY OF ENVIRONMENTAL TREATY-MAKING (Oxford Univ. Press 2003).

mechanisms to monitor members' compliance with the club's rules and discipline those who fail to comply; in this respect they are different from pure "rules-of-the-road" coordination games.

Linkage Strategy: This strategy leverages existing transnational organizations with missions other than climate protection. It does this by tapping the initiative of key, strategically situated organizational actors that support greenhouse gas (GHG) mitigation to launch new initiatives that further the organization' basic mission while also achieving climate objectives. While there may not be institutional support for climate protection as such, there may be strategic pockets of support and functional alignment between the organization's existing mission and initiatives that will achieve GHG reductions may enable policy entrepreneurs to link the two. Examples of this linkage strategy are the inclusion of rural renewable energy and low-GHG agriculture in existing bilateral and multilateral development programs or the extension of the Montreal Protocol to include currently unregulated ozone depleting substances (ODS) or ODS-substitutes that are GHGs. A somewhat different type of linkage is to build on existing institutionalized patterns of cooperation among an institution's members to support new non-climate activities that benefit members but also reduce GHG emissions. An example is the Association of Southeast Asian Nations (ASEAN) Agreement on Transboundary Haze Pollution.

Dominant Market Actor Strategy: The third strategy reduces GHG emissions through the power of public authorities or private actors with a dominant position in specific global or regional market sectors that enable them to effectively set or at least strongly dominant influence the regulatory norms governing the sector. The exercise by governments of such power has been analyzed as the California effect (e.g., California's motor vehicle emission standards) or the Brussels effect (e.g., the European Union's product regulations).[6] Where dominant public or private actors enjoy sufficient economic, strategic, or reputational gain from being a first mover in adopting regulatory or market standards, they may act unilaterally to induce others in the sector to follow suit (e.g. the expansion of the European Union Aviation directive to foreign airlines). In appropriate contexts, dominant actors may have incentives to adopt measures that have the purpose or effect of reducing greenhouse gas emissions. A dominant private firm or small group of firms in a market for a given climate-beneficial technology, such a wind turbine nacelles or grid technologies, may adopt or promote adoption by governmental authorities of product and performance standards that would give the firm a competitive advantage. At the same time, these standards also would secure greenhouse gas reductions. Other firms may be obliged to follow because the leader's dominant market position may enable it effectively to set market standards or to secure regulations that make their standard generally applicable.

In recent years, the torpor of the UNFCCC negotiation process has stimulated calls for more decentralized approaches to climate protection. The innovation of the building block approach consists in its three institutional templates for developing decentralized regimes and the logic that informs them. We recognize that there will be institutional and other challenges in developing successful building block regimes, but we believe the potential payoff will be significant and well worth the effort.

We also acknowledge the risk that a decentralized approach will, as some developing countries fear, divert energy from the UNFCCC process, and create an impression that bottom-up initiatives will solve the climate problem. Such a result could undermine and decrease the ambition for the

[6] Anu Bradford, *The Brussels Effect*, 107 NW. U. L. REV. 1, 5–6 (2013).

international climate regime. The building blocks proposal, however, is intended to and can support the UNFCCC process. It can enhance the willingness and ability of countries to agree to binding international targets. It will do so in two ways: First the building blocks will reduce greenhouse gas emissions in the short term by capitalizing on the self-interested incentives of many diverse actors. This would help clarify and reduce the cost of setting greenhouse gas emissions caps, and it could change the views of important players regarding the cost of such reductions.[7]. Second, the building blocks approach will build webs of transnational cooperation and trust that will foster international climate action. Both of these could promote the likelihood of negotiating an inclusive and effective climate treaty.[8] These contributions would be strengthened by arrangements, discussed in Part V, for cooperative emissions monitoring, reporting, and other information-based arrangements among the individual building block regimes, and with the UNFCCC process. Although individually these regimes would make only moderate contributions to mitigation, the cumulative effect in reducing greenhouse gas emissions, building webs of transnational cooperation on climate-related objectives, and catalyzing progress on a global mitigation treaty promises to be considerable.

This Article is organized as follows: Section I outlines the significant limitations of the UNFCCC approach to climate action. Section II presents the corresponding advantages of the building block approach. Sections III to V provides examples of regimes that have and could be developed to implement the club strategy, the linkage strategy, and the dominant market actor strategy. Section VI discusses the necessary components of transnational institutional regimes to facilitate, scale up, and coordinate the building block actions through concerted monitoring, reporting, and other information sharing arrangements. Section VII concludes.

I. Obstacles for achieving Global Climate Action

There are inherent and grave challenges in achieving an effective global regime of cooperation among nations for climate mitigation. The design features of the UNFCCC approach exacerbate these challenges. These features help explain why the UNFCCC process has made relatively scant progress in securing an international agreement that would significantly reduce greenhouse gas emissions.

A. Inherent challenges in securing an effective international climate protection treaty

There is strong evidence that, on a global aggregate basis, the benefits of significant climate mitigation are substantially greater than the costs.[9] In this context, we assume that the relevant actors for achieving climate mitigation are states: States have the legal authority to impose limitations obligations on their citizens; the financial, administrative, and other means to enforce those obligations; and to take other steps to limit net greenhouse gas emissions from activities within their borders. We also assume that, in international relations, states primarily, if not exclusively, follow considerations of national interest, as shaped and constrained by domestic governance structures and interests. As a crude approximation, states primarily follow a calculus of national costs and benefits,

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[7] Jeffrey Heal & Howard Kunreuther, *Tipping Climate Negotiations* (Nat'l Bureau of Econ. Research, Working Paper No. 16954, 2011).

[8] Daniel H. Cole, *From Global to Polycentric Climate Governance*, 2 CLIMATE L. 395 (2011).

[9] *See* NICHOLAS STERN, STERN REPORT: THE ECONOMICS OF CLIMATE CHANGE vii (2006), Brian Fisher et al., *Issues Related to Mitigation in the Long Term Context*, *in* CLIMATE CHANGE 2007: MITIGATION. CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTER-GOVERNMENTAL PANEL ON CLIMATE CHANGE 169 (Bert Metz et al. eds., 2007); William Nordhaus, *Why the Global Warming Skeptics Are Wrong*, NEW YORK REVIEW OF BOOKS 32, 34 (Mar. 29, 2012).

shaped to a greater or lesser extent by the cost-benefit perceptions of their citizens, of organized interest groups, and of powerful governmental and non-governmental institutions. Further, as is evident, concern about climate change and support for climate mitigation varies very widely among different nations.[10]

Even if all countries perceived that the benefits of mitigation exceeded the costs, there would be formidable obstacles to achieving a global mitigation treaty. Climate change provides the paradigmatic case of a global public good: Greenhouse gases mix globally, and climate change is a function of global atmospheric concentrations. As a result, states acting unilaterally cannot sufficiently limit dangerous buildup of greenhouse gases in the atmosphere. Further, the benefits of the mitigation measures that a country might adopt on their own would accrue not only to the country adopting the measures but also to countries that continue to pollute. Thus, a nation that unilaterally limits its greenhouse gas emissions would bear all of the costs of such measures, while most of the benefits accrue to other nations. As such, the incentives to free ride are extremely powerful.[11] Moreover, in a world of international free trade and investment, the costs of such measures to the country adopting them are increased by the leakage of investment and economic activity to jurisdictions that do not have greenhouse gas regulations and accordingly offer lower production costs. In the climate context, the costs of unilateral mitigation action for all but the largest countries would greatly exceed a country's share of the global benefits obtained.

The evident solution is to negotiate an international treaty whereby all major emitting countries agree to some scheme of joint emissions limitations. The problems in doing so include agreeing on the terms of cooperation, which will determine the allocation of the costs and benefits of the undertaking; avoiding free riding by securing participation by all major emitting jurisdictions; and developing and instituting credible arrangements to secure mutual compliance and prevent defection. These problems are formidable, even in the case where all countries perceive national net benefits from mitigation. However, in climate, the cost-benefit analysis for mitigation varies widely among countries. And as international agreement require the voluntary consent of all nations, these varying levels of national benefit will need to be accommodated through individual modifications to the agreement (e.g., by less demanding emissions limitations obligations or side payments).

B. The Montreal Protocol strategy, generated by incentives for unilateral action, is not viable for climate

There is a possible shortcut to the challenges of negotiating a treaty to secure a global public good such as climate protection. In cases where the net global benefits of mitigation are quite large, one or a few large jurisdictions might reap a sufficient share of the global benefits to justify the costs of unilateral action, based on a national cost-benefit calculus. An example is U.S. investment in global military security. In such cases, smaller non-participating countries can free ride and reap the benefit of the large countries' actions; Mancur Olson termed this the "exploitation of the great by the small."[12]

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[10] WORLD BANK, PUBLIC ATTITUDES TOWARDS CLIMATE CHANGE: FINDINGS FROM A MULTI-COUNTRY POLL (World Bank 2009), *available at*: http://climatechange.worldbank.org/node/5322; Julie Ray & Anita Pugliese, *Worldwide, Blame for Climate Change Falls on Humans*, GALLUP WORLD (Apr. 22, 2011) *available at* http://www.gallup.com/poll/147242/Worldwide-Blame-Climate-Change-Falls-Humans.aspx

[11] *See* BARRETT, *supra* note 5, at 219.

[12] *See* MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS 169 (Harvard Univ. Press 1965).

Global atmospheric ozone depletion provides an environmental example of a situation where it was in the self-interest of major jurisdictions to unilaterally take action that would provide global benefits.[13] By the mid-1980s, the benefits of phasing down ozone-depleting substances—primarily avoided skin cancers—were well established. Depletion of the stratospheric ozone layer enables greater amounts of ultraviolet radiation to reach the earth's surface, causing increases in the incidence of skin cancer. The evidence indicated a very clear cause-and-effect relationship: The incidence of skin cancer increased in a non-liner fashion; a given increment in ozone depletion produced a proportionately greater increase in cancers. Therefore, controls on ozone-depleting substances would correspondingly reduce ozone depletion and cancers. Phasing out ozone-depleting substances would avoid more than 245 million cases of cancer globally.[14] Moreover, the costs of controlling ozone-depleting substances by switching to substitute chemicals were relatively small and would be borne by a few industrial firms in one sector. The Reagan administration was motivated to act on ozone-depleting substances by a U.S. Environmental Protection Agency (EPA) cost-benefit analysis, which showed that the benefits of controls on U.S. production (fewer U.S skin cancers) alone far exceeded the costs of those controls.[15] Further, U.S. manufacturers were already developing substitutes and accordingly did not strongly resist regulatory controls; they may even have supported controls that stood to give them an advantage over their European competitors.[16] Eventually, the European Economic Commission also opted for controls. The United States and Europeans were not, however, content to allow other countries to free ride on their efforts, including developing countries whose emissions of ozone-depleting substances were relatively low but growing and could, if unchecked, cause many cancers among the populations of the two superpowers. The two economic superpowers accordingly spearheaded the Montreal Protocol and succeeded in enlisting other countries to join. To bring developing countries on board, the developed countries eventually provided for financial transfers from the developed to the developing countries that covered the incremental costs of reductions and also imposed a credible threat of substantial trade sanctions.[17]

This scenario, however, is not viable in the climate case.[18] Currently, the European Union is the sole major national or supranational jurisdiction committed to significant unilateral mitigation action.[19] Its commitment reflects a variety of goals, including energy security, technological leadership, societal and political revitalization, global soft power, concern about the adverse effects of climate change on Europe, the influence of green political constituencies in many member states, and the power of elites in shaping EU policies.[20] The European Union, however, has not been able to mobilize any other major emitting country to join in this effort. Most developed country governments have concluded that the

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[13] *See* RICHARD BENEDICT, OZONE DIPLOMACY: NEW DIRECTIONS IN SAFEGUARDING THE PLANET (1998); BARRETT, *supra* note 5, at 221–53.
[14] BARRETT, *supra* note 5, at 228.
[15] *See* ENVIRONMENTAL PROTECTION AGENCY, ASSESSING THE RISKS OF TRACE GASES THAT CAN MODIFY THE STRATOSPHERE (1987); ENVIRONMENTAL PROTECTION AGENCY, REGULATORY IMPACT ANALYSIS: PROTECTION OF STRATOSPHERIC OZONE (1987).
[16] Peter M. Morrisette, *The Evolution of Policy Responses to Stratospheric Ozone Depletion*, 29 NAT. RESOURCES J. 793, 816 (1989).
[17] The Montreal Protocol regime thus reflects the self-interest of the United States and the European Union. The European Union faced a similar cost-benefit analysis for purely domestic action; it benefitted from enlisting other countries in controls, including through trade sanctions and side payments. *See* BARRETT, *supra* note 5, at 221–53.
[18] Cass Sunstein, *Of Montreal and Kyoto: A Tale of Two Protocols*, 31 HARV. ENVTL. L. REV. 1, 5 (2007).
[19] Miranda A. Schreurs and Yves Tiberghien, *Multi-Level Reinforcement: Explaining European Union Leadership in Climate Change Mitigation*, 7 GLOBAL ENVTL. POL. 19, 19 (2007).
[20] *See Id*.

discernible national benefits from unilateral action to mitigate climate change are unlikely to outweigh the national costs over a politically relevant timeframe, notwithstanding that the long-term benefits appear to be large. The benefits of greenhouse gas reductions, the bulk of which will occur far in the future, are far less clear cut than reducing emissions of ozone-depleting substances, where reductions could be directly linked to significantly fewer cancers. The relationship between reducing greenhouse gas emissions and mitigating the adverse effects of climate is more difficult to quantify. Many scientists fear the existence of thresholds whereby catastrophic consequences will occur if atmospheric concentrations or the rate of increase in those concentrations exceed a given level; yet, the existence and location of such thresholds is not known.[21] Significant limitations on greenhouse gas emissions require changes by many actors in a wide range of sectors and costs are still uncertain.[22] Uncertainties over mitigation costs and their potential adverse impacts on the economy, reinforced by the political power of high greenhouse gas-emitting economic interests, also have led developed countries outside the European Union to resist committing to mitigation measures at scale.

C. Features of the UNFCCC strategy that intensify the problems in reaching agreement on global climate protection

As discussed above, the nature of global climate change makes international agreement difficult. The structure of the UNFCCC makes this problem even more challenging by:

1. Including all countries (but only countries) in negotiating and joining a single universal climate agreement;

2. Establishing a rigid division between developed and developing countries and their respective responsibilities;[23]

3. Making limitations legally binding;

4. Including all greenhouse gas emissions sources and sinks in a single agreement;

5. Imposing economy-wide caps on the net emissions of all greenhouse gases for each country that is subject to limitations commitments;

6. Providing each country with full discretion to design and implement limitations measures so long as it achieves its assigned cap;

[21] R.B. Alley et al., *Abrupt Climate Change*, 299 SCIENCE 2005, 2005 (2003). [BB][CC]

[22] Early studies suggested that costs were potentially very large, *see* STERN, *supra* note 9, at 211. However, more recent estimates have indicated that for some sectors, costs may be smaller than anticipated, *see* COMMITTEE ON CLIMATE CHANGE, SCOPE OF CARBON BUDGETS: STATUTORY ADVICE ON INCLUSION OF INTERNATIONAL AVIATION AND SHIPPING 49-51 (Apr. 2012).

[23] With the Durban Platform on Enhanced Action (Report of the Conference of the Parties on Its Seventeenth Session, Addendum, Part Two: Action Taken by the Conference of the Parties at Its Seventeenth Session, *Decision 1/CP.17: Establishment of an Ad Hoc Working Group on the Durban Platform for Enhanced Action*, U.N. Doc. FCCC/CP/2011/9/Add.1, at 1 (Mar. 15, 2011)) potentially proposing emissions limitation commitments for all countries, this division might be eroding. However, the Framework Convention will still contain differential obligations, as will the Kyoto Protocol. *See* Joseph E. Aldy & Robert N. Stavins, *Climate Negotiations Open a Window: Key Implications of the Durban Platform for Enhanced Action* (Harvard Kennedy Sch. Belfer Center for Sci. & Int'l Affairs, Policy Brief, Sept. 2012).

7. Setting relatively long time periods for countries to achieve their caps. (Note that this feature and the previous three are highly desirable from the perspective of cost effectiveness); and

8. Developing robust compliance incentives and mechanisms.

While the benefits of a collective agreement likely outweigh the costs for developed countries as a group,[24] the UNFCCC strategy has thus far failed, primarily because it requires universal participation and agreement by all countries (Feature 1). This feature multiplies the burdens of negotiation and the difficulty of reaching agreement under the international law norm of decision by consensus. The persistence of the developed/developing country divide (Feature 2) has increased the difficulty of securing agreement to limitations commitments by major emitting developing countries. These impediments could be overcome if a small number of major emitting jurisdictions, including both developed and developing nations, first agreed on emissions limits (e.g., the European Union, United States, China, India, and Brazil). If these countries reached agreement, they would most likely be able to enlist the other major emitting jurisdictions through multilateral trade measures, side payments, and other inducements. However strongly smaller nations might protest against exclusion from the initial negotiations, they could later be brought on board through side payments in the form of climate finance or technology transfer. But it appears that for the foreseeable future the dominant decision makers in the United States, China, and India believe that the economic and political risks of such an initiative outweigh the likely national benefits from mitigated climate change. Without the participation of these key countries, a greenhouse gas pact among major emitting countries will not be achieved.

The UNFCCC strategy of legally binding targets and timetables for emissions reduction, with targets set for compliance many years in the future and including all emissions in a country's national economy (Features 3, 4, 5, and 7), has compounded the problem of securing agreement. There remain very great uncertainties about mitigation costs and benefits and about future national economic and political conditions. As a result, governments are reluctant to commit to fixed emissions caps on their entire economies. Similarly, firm national emission caps may lead to a zero-sum conflict among domestic interest groups over the allocation of the burden of reductions.[25] Economy-wide targets and timetables covering all gases, sources, and sinks (Feature 6) have the virtue of allowing countries maximum flexibility in reducing emissions. This is because it allows them to choose the most cost-effective domestic measures to meet their national emissions reductions targets.[26] However, as described above, there are significant drawbacks with respect to negotiating an agreement with economy-wide targets.

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[24] *See* STERN, *supra* note 9, at xxii; Fisher, *supra* note 9; and Nordhaus, *supra* note 9.

[25] In the 1990s, the United States championed the targets and timetables approach, while the European Union preferred policies and measures in which countries would agree to adopt harmonized standards for controlling different gases and emissions sources. The United States argued that an umbrella target, covering all gases, sources, and sinks, would give countries flexibility to pursue the cost-effective means for limiting overall greenhouse gas emissions. For example, countries could facilitate international emissions trading, which might have environmental advantages. *See* RICHARD STEWART & JONATHAN WEINER, RECONSTRUCTING CLIMATE POLICY: BEYOND KYOTO 59 (AEI Press 2003). Ironically, Europe has now embraced targets and timetables, while the United States has abandoned them.

[26] The McKinsey global abatement cost curve illustrates the potential national emissions reduction opportunities. *See* McKinsey & Co., *Impact of the financial crisis on carbon economics: Version 2.1 of the global greenhouse gas abatement cost curve,* August 2010, *available at* http://www.mckinsey.com/client_service/sustainability/latest_thinking/greenhouse_gas_abatement_cost_curves.

Finally, a pervasive problem in securing agreement under the UNFCCC strategy is the lack of robust compliance arrangements, including adequate arrangements for accurately monitoring emissions and credible arrangements (such as trade sanctions and firm arrangements for side payments, on the Montreal Protocol model) that would deter or address noncompliance (Feature 8). Also problematic is that caps give countries long lead times and a large amount of discretion in taking steps needed to reduce emissions many years hence. Thus participants cannot be assured that other countries will comply with the agreements. A country that seeks to comply with future limitations must make significant undertakings now. However, it will be difficult to verify that the measures being announced by other countries today will be fully implemented, will involve comparable effort, or succeed in achieving caps years in the future.

II. The Building Block Approach for Promoting Climate Protection

The current UNFCCC treaty impasse requires a radical rethinking of strategy, as exemplified by the building block approach. That approach differs from the UNFCCC strategy with respect to each of the eight UNFCCC design features discussed in the previous subsection:

1. The building block approach does not seek to include all countries in a climate regime. It envisions multiple special purpose regimes, each with a limited number of participants, through arrangements that are sectoral or regional. Regime membership would not be limited to countries and may include subnational jurisdictions, firms, NGOs, and international organizations.

2. There is no strict developed and developing country bifurcation; many building block regimes would be based on cooperative arrangements between developed and developing countries.

3. The undertakings in specific regimes would not necessarily be legally binding, although they could be if the participants so choose.

4, 5. The various building block regimes would target particular economic sectors or regions and, where greenhouse gas mitigation is an explicit objective, the regimes would target specific types of gases, sources or sinks, and measures and policies.

6. Each regime would determine, with reasonable specificity, the actions to be undertaken by the participants to further of the regime's objective.

7. The regime work plan would call for a series of steps, taken incrementally, over moderate time periods, with the prospect for additional installments of cooperative work.

8. The regimes would monitor participants' compliance with the regime's norms, exclude non-complying participants from the regime's benefits, and take other appropriate measures to promote compliance.

Reliance on a variety of smaller-scale regimes avoids or alleviates the problems involved in organizing and implementing a comprehensive global regime. Through diversification, it reduces the costs of regime failure. A further advantage of the building block approach is that it enlists as participants not only countries but also subnational jurisdictions, firms, and civil society organizations,

all of which can contribute to mitigation progress.[27] Directly engaging these actors, which are not members of the UNFCCC process, in transnational institutions for climate mitigation is critical. They are the portions of society that will be implementing the bulk of the emissions reductions.

In smaller-scale regimes, which involve a limited number of actors focused on achieving specific ends, participants can more readily develop institutional arrangements that generate trustworthy information about performance, monitor each other's performance, and address nonperformance. In regimes designed in accordance with a club strategy, participants who failed to perform would be excluded from continued participation and the attendant benefits. In regimes designed in accordance with a linkage strategy and dominant actor regimes, a variety of other measures to address nonperformance would be available depending on the particular type of regime. These smaller regimes, appropriately linked, could serve as a stepping stone to larger and deeper regimes.[28]

A. The Three Building Block Strategies

Concern over climate change and support for mitigation is quite uneven across jurisdictions. This circumstance is a serious impediment to achieving a global climate treaty; intense support in some jurisdictions does not compensate for indifference or opposition in others.[29] The building block approach adapts to the unevenness in support for mitigation through three basic techniques.

Tapping non-climate incentives: First, the building block approach accepts that many nations currently pursue conceptions of national interest that make climate protection a low priority; that firms maximize profits; and that most consumers maximize their economic welfare. The approach's assumptions regarding the motivations of relevant actors are parsimonious. It seeks to tap non-climate motivations through incentives for governments, subnational jurisdictions, firms, and consumers to take self-interested actions that also would further climate protection. Accordingly, many building block regimes would be based on achieving economic, security, or other self-interested objectives rather than mitigation. It would do so through measures that produce net greenhouse gas reductions as a co-benefit. Many regimes would deal with the energy sector, which accounts for 48% of greenhouse gas emissions and 61% of emissions if transportation is included.[30] Some environmentalists and UNFCCC supporters, however, may attack this approach for abandoning environmental protection motivations and ideals in favor of appeals to self-interest.

Leveraging pockets of mitigation support through linkages with existing institutions. Second, the building block approach seeks to take advantage of the dispersed pockets of support for mitigation—those that are found in various countries, governmental agencies, consumer populations, subnational jurisdictions, and international organizations. It recognizes that many relevant government organizations (e.g., environmental and development aid agencies) and international organizations concerned with development (e.g., multilateral development banks, UN agencies, and international

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[27] Kenneth W. Abbott, *The Transnational Regime Complex for Climate Change*, 30 ENV'T & PLAN. C: GOV'T & POL'Y 571, 581 (2012).
[28] George W. Downs, David M. Rocke & Peter N. Barsoom, *Managing the Evolution of Multilateralism*, 52 INT'L. ORG. 397, 398 (1998); Michael J. Gilligan, *Is there a Broader-Deeper Trade-Off in International Multilateral Agreements?* 58 INT'L. ORG. 459, 460 (2004).
[29] The Kyoto Protocol can be regarded as a somewhat successful effort to deal with this circumstance by securing commitments from jurisdictions with strong to moderate support for mitigation. But the Kyoto Protocol has failed to stimulate deeper or broader actions; it continues post-Durban in etiolated form.
[30] World Resources Institute, *World GHG Emissions Flow Chart*, CLIMATE ANALYSIS INDICATORS TOOL, http://cait.wri.org/figures.php?page=/World-FlowChart (last visited Mar. 12, 2013).

financial institutions) have, to varying extents, incentives and a degree of latitude to pursue policies that reduce greenhouse gas emissions. This latitude may be the result of agency slack or because nations that dominate such international organizations either favor or are prepared to acquiesce in such policies. Countries may support or tolerate these policies when undertaken through international organizations even though they are unwilling to adopt far-reaching domestic limitations measures or to agree to internationally binding emissions limitations.

Various building block regimes can be developed to take advantage of these circumstances through a linkage strategy. The linkage strategy would build on existing institutions with non-climate missions and tap existing pockets of mitigation support to modify or extend the institutions' existing programs to include measures that would reduce greenhouse gas emissions. By leveraging existing institutions in this fashion rather than seeking to create entirely new bodies directed exclusively at mitigation goals, the building block approach economizes on the limited and uneven support for mitigation that currently exists.

There may be opportunities to combine non-climate incentives and linkage techniques in a single regime. For example, existing transnational regimes, composed of firms and NGOs, leverage support from many developed-country consumers to improve labor conditions and environmental sustainability in developing countries by regulating product manufacturing.[31] This model might be extended to include climate objectives, thereby tapping consumer demand for climate-sustainable products to which firms would respond with mitigation measures.[32]

Promotion by dominant actors of transnational greenhouse gas regulatory programs: Countries, a firm, or a small group of firms with a dominant market position in a given economic sector might be able to use their power to induce other countries or firms to adopt mitigation measures that the countries or firms would not otherwise undertake. For example, in the country case, a jurisdiction such as the European Union may be able to use its market power by imposing greenhouse gas-reducing regulatory standards on imported goods or services (such as airline transport). The European Union is well suited for such a task, because it is strongly committed to climate protection and also has a substantial share of the relevant global and regional market. Such action by the European Union might induce firms either to conform to or adopt the European Union's standards. Achieving the "California" or "Brussels" effect would be possible because firms benefit from having economies of scale across different jurisdictions and because some jurisdictions like the European Union have a dominant market position.[33] A small number of countries that in the aggregate enjoy significant market power may agree to pursue such a strategy jointly. Strategic considerations may lead firms in the sector to respond to the dominant jurisdiction's measures by forming a self-regulatory industry club to adopt standards similar to those of the dominant jurisdiction.

Dominant firms in an industry sector might independently form a club to adopt greenhouse gas-reducing standards not because they favor mitigation as such but because they foresee that greenhouse gas regulation is likely to be imposed by government authorities sooner or later. Moving first would

[31] Examples include the Forest Stewardship Council and the Worker's Rights Coalition.
[32] *See* Michael P. Vandenbergh, *The New Wal-Mart Effect: The Role of Private Contracting in Global Governance*, 54 UCLA L. REV. 913–70 (2007).
[33] *See* DAVID VOGEL, TRADING UP: CONSUMER AND ENVIRONMENTAL REGULATION IN A GLOBAL ECONOMY (1995).

allow them to shape the regulatory standards to their advantage or to preempt government regulation altogether.[34] Such a club may gain a competitive advantage over rivals that are not part of the club.[35]

Alternatively one or a few firms with significant market power in an industry may cooperate to support climate regulatory measures by a dominant jurisdiction or jurisdictions in order to obtain first-mover advantages, including competitive advantages. Ozone-depleting substance manufacturers, most notably Du Pont, apparently followed such a strategy with respect to adoption of the Montreal Protocol.[36] In some cases, dominant government and private actors may work together. For example, in the case of aircraft emissions, if Airbus and Rolls-Royce believed they could produce fuel-efficient aircraft and engines more cost effectively than their competitors, they might ally with the European Union in its aviation emissions trading system (ETS) initiative. Alternatively, Airbus and Rolls-Royce might push the International Civil Aviation Organization (ICAO) to adopt industry-wide standards that favor them. Firms also might form a technology standards club and then ally with a pro-climate jurisdiction or work with a regional or international standards organization to secure wider adherence to the standard within the industry.

The diverse transnational regimes developed in accordance with these three strategies along with the means for linking, supporting, and stimulating them constitute the building block approach for climate protection.

B. Tapping Non-Climate Incentives with Climate Co-Benefits

In many instances, building block regimes would seek to tap various non-climate incentives to encourage state and non-state actors to take actions for self-interested reasons that would or could have the effect of reducing greenhouse gas emissions as a co-benefit. These incentives are more pervasive and more powerful than support among actors for climate mitigation as a goal in itself.

Governments at all levels, firms, and consumers all have strong incentives to reduce energy costs and to minimize large fluctuations in energy prices. Governments can promote these objectives not only through procurement policies but also through regulatory measures, financial inducements to firms and consumers, research-and-development programs, and infrastructure investments. In addition, national governments have security and other incentives to take steps to reduce energy imports. Governments at all levels have incentives to develop industries, including export-oriented industries, to meet demands for energy-efficient and low-greenhouse gas emissions goods and services and to secure global competitive leadership in green technologies.[37] They also seek to reduce conventional air

[34] This objective appears to have played a role in concerted steps by the leading global aluminum firms to develop and adopt technologies and methods to reduce their energy consumption and emissions of perfluorocarbons through the EPA Voluntary Aluminum Industrial Partnership. *See* U.S. EPA, Voluntary Aluminum Industrial Partnership, http://www.epa.gov/aluminum-pfc/index.html.

[35] Such a circumstance may raise concerns under competition law and policy, particularly because of the potentially monopolistic behaviors. This discussion is important, but beyond the scope of this paper.

[36] *See* RICHARD BENEDICT, OZONE DIPLOMACY: NEW DIRECTIONS IN SAFEGUARDING THE PLANET (1998); BARRETT, *supra* note 5, at 234 (2003).

[37] For example, China has aggressively used state subsidies to spur development of renewable energy technologies. In 2010, China led the world in both new renewable-energy investment and existing renewable capacity (including hydro). The impetus behind the investments seems not to be reducing greenhouse gas emissions; China continues to add new coal-fired power plants weekly. Rather, its investment in renewable energy appears to be driven by a desire to dominate the global market in these technologies in order to enhance China's economic and political power. For now, China appears unwilling to adopt binding international commitments to limit greenhouse gas emissions from its domestic economy as a whole.

pollutants and ozone-depleting substances to achieve domestic health benefits. The regulatory and other means for doing so also often reduce greenhouse gas emissions. Regional and municipal governments have competitive and other incentives to reduce energy and resource use and traffic congestion, rationalize management of wastes, and enhance urban amenity values through green development/redevelopment programs.[38] Governmental regulatory, research-and-development, and finance/subsidy programs may achieve several of the above goals simultaneously, including feed-in tariffs for renewables; subsidies and regulatory requirements for domestically produced biofuels, energy labeling, and efficiency requirements and standards;[39] programs to subsidize or assist building owners to retrofit energy efficient materials and technologies; [40] and programs to support nuclear power.

In addition to reducing their own energy and resource use, firms have additional competitive incentives to develop and market energy-efficient goods and services to meet consumer demand for minimizing energy costs and energy pricing risks. Similarly, firms have a competitive incentive to develop and market low-emissions goods and services, such as hybrid and electric cars,[41] in order to secure the patronage of governments and consumers that currently have mitigation policies and preferences. Such actions would position firms competitively to take advantage of future climate regulations and policies. These competitive opportunities include not only energy efficient, low-emissions technologies and goods but also associated services in banking, investment, insurance, carbon market services, energy audits/consulting, and green certification and labeling programs.

The building block approach builds on these and other incentives, which extend to many different types of actors. This approach provides rich ground for transnational cooperation that includes developing country government bodies and firms. Even in jurisdictions with governments that are unwilling to commit to legally binding caps, there likely would be a significant number of government and private actors with the incentive and freedom to participate in transnational schemes for concerted regulatory action, research-and-development programs, infrastructure development, and financial measures that produce greenhouse gas emissions reductions as a side benefit. Jurisdictions or firms with significant market power also may leverage their position to foster transnational regulatory regimes that reduce greenhouse gas emissions. The building block approach seeks to exploit such opportunities, which the state-centric UNFCCC approach misses.

By capitalizing on these circumstances, the building block approach could achieve appreciable greenhouse gas emissions reductions and help reduce the economic and political costs of achieving such reductions by stimulating innovation and diffusion of low-emissions technologies, policies, and practices within many sectors and regions, including in developing countries whose economies are

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[38] *See* OECD, *Green Cities: New Approaches to Confronting Climate Change* (2009), *available at* http://www.oecd.org/dataoecd/46/33/45377963.pdf; RICHARD FLORIDA, CITIES AND THE CREATIVE CLASS (2005).

[39] Michael Vandenbergh, Thomas Dietz & Paul Stern, *Time to Try Carbon Labeling*, 1 NATURE CLIMATE CHANGE 4 (2011).

[40] *See* JULES BAILEY, ENERGIZING CITIES: NEW MODELS FOR DRIVING CLEAN ENERGY INVESTMENT (Eileen V. Quigley, ed., New Energy Cities, 2010), *available at* http://newenergycities.org/most-recent-posts/resources/energizing-cities-new-models-for-driving-clean-energy-investment/view. Examples include on-bill financing (which allows utilities to collect retrofit loans), PACE financing (which allows retrofit loans to be repaid through property taxes), and performance contracting (which pays service providers for a portion of the savings generated from energy-efficiency measures and requires them both to install and manage the projects).

[41] In addition, firms that believe climate regulations will be adopted will have further incentives to invest in research and development in order to position themselves as market leaders in low-emissions technologies.

growing much faster than those of developed countries. It also would build webs of cooperation and mutual trust between and among political jurisdictions at different levels, firm, NGOs, and other actors that would provide a foundation for further cooperative arrangements that would reduce greenhouse gas emissions and facilitate the successful negotiation of a climate treaty. [42]

C. The Novelty of Our Building Block Approach

We recognize that dissatisfaction with the UNFCCC process has already led to calls by many policy analysts, NGOs, governments, and international organizations for countries to embrace a pluralist, decentralized, bottom-up strategy that reduces greenhouse gas emissions,[43] including policy papers that use the term "building block."[44] Accordingly, it may fairly be questioned whether our approach adds anything new. We submit that our approach has two distinctive and valuable features.

First, the approach offers policy entrepreneurs in government, industry and NGOs three specific institutional structures, and strategies for developing building block cooperation: the club, linkage, and dominant market actor strategies. These strategies provide conceptual and practical frameworks for building new special purpose transnational regimes designed to capture the emissions reductions that can be achieved through focusing on non-climate incentives. Further, these regimes would provide concrete information about the costs and generate many different opportunities for cooperatively mitigating greenhouse gas emissions.

Second, as developed in Part V, the building block approach contemplates cooperative greenhouse gas emissions monitoring, reporting, and other information-based arrangements that link individual building block regimes to each other and to the UNFCCC process. To monitor success, each regime would monitor its participants' compliance and the regime's overall performance. Where feasible, the greenhouse emissions reductions would be quantified and integrated on a country-by-country basis into the UNFCCC reporting process. This would recognize the efforts of countries and their citizens and give them an incentive to support the regimes. Firms also could be recognized for their contributions.[45] The creation of these institutional structures and the information produced would build

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[42] A similar dynamic is presented in Johannes Urpelainen, *A Model of Dynamic Climate Governance: Dream Big, Win Small*, 13 INT'L ENVIRON. AGREEMENTS 107 (2013)

[43] *See* Joseph E. Aldy et al., *Architectures for Agreement: Addressing Global Climate Change in the Post-Kyoto World* (2007); CLIMATE AND TRADE POLICY: BOTTOM-UP APPROACHES TOWARDS GLOBAL AGREEMENT (Carlo Carraro & Christian Egenhofer, eds., 2007); Steve Rayner, *How to Eat an Elephant: A Bottom-Up Approach to Climate Policy*, 10 CLIMATE POL'Y 615 (2010); Lutz Weischer et al., *Climate Clubs: Can Small Groups of Countries make a Big Difference in Addressing Climate Change?*, 21 REV. EUR. COMMUN. & INT'L ENVTL L. 177 (2012).

[44] Timothy Worth & John Podesta, *Building Blocks Toward Global Climate Action*, HUFFINGTON POST (Nov. 30, 2010), http://www.huffingtonpost.com/timothy-wirth/building-blocks-toward-gl_b_789909.html; Robert Falkner, Hannes Stephan & John Vogler, *International Climate Policy After Copenhagen: Towards a "Building Blocks" Approach*, 1 GLOBAL POL'Y 252 (2010). *See also* Urpelainen, *supra* note 42.

[45] We recognize that it often will be difficult to measure, even indirectly, the mitigation benefits of building block regime activities. We also recognize that the participants in many of these bodies, especially those with objectives other than mitigation, might be reluctant for various reasons to underwrite monitoring, reporting, and verification of mitigation performance (e.g., per fear of revealing proprietary information or otherwise advantaging competitors or per the cost and other burdens of such monitoring). Further, we recognize that organizations other than the individual building block regimes would need to help build and finance these information pooling and reporting arrangements; major economic forums, international financial institutions, UN Environment Programme and UN Development Programme, and major global civil society organizations could all contribute to these efforts.

trust and confidence and would assure countries that emissions reductions can be achieved at a particular cost.

The remainder of this article examines three basic elements in implementing the building block approach:

- How to use club, linkage/leverage, and dominant market actor analyses. This discussion will identify a suite of potential building block regimes in specific sectors and regions that would mobilize incentives by delivering benefits to participants and also would achieve greenhouse gas reductions.
- How to design incentive-compatible institutional structures for specific building block regimes. This discussion will consider appropriate monitoring, reporting, and verification arrangements and will consider how these structures can draw on developed countries, existing international organizations, trade associations, and others to serve as organizational sponsors for the development of specific regimes.
- How to specify a global monitoring, reporting, and verification network to affiliate and assist the several building block regimes in monitoring and reporting emissions reductions in a manner that is compatible with UNFCCC reporting regimes.

III. Using the Economic Theory of Clubs to Design Effective Building Block Regimes

A. The Theory of Clubs

Club theory first emerged to describe goods that are neither purely public nor purely private—goods that are at least partially excludable (it is possible to exclude non-members from accessing them) and at least partially non-rivalrous (one individual's use of the good does not subtract from another individual's simultaneous use of that good).[46] Classic examples of clubs that charge a fee to provide exclusive goods to their members or patrons are golf clubs, movie theatres, and gated communities. The non-rivalrous nature of a club good differentiates it from classic private goods. The ability for multiple actors to simultaneously use the good eliminates the zero-sum dynamic that otherwise leads private actors to hoard goods. Instead, utility-maximizing actors have an incentive to share club goods with other actors and charge membership fees or tolls.[47]

In return for access to the club good, members usually are required to pay a membership fee or comply with other club rules designed to sustain production of the club good. For instance, research and development clubs would require members contribute financially to joint research, development, and demonstration efforts among club members. Membership fees are not necessarily limited to financial contributions. Some information-based clubs, for instance, may instead require that members report data on the efficacy of various energy-efficiency measures or open their operations to inspection. Other clubs also may require members to adopt regulatory policies or otherwise constrain their behavior to meet club rules, often in lieu of or in addition to other membership fees. For instance, technical harmonization clubs may not require financial contributions, but instead generate club benefits from requiring members mutually to adopt standards that reduce transaction costs in trade of low-emission products. Similarly, regulatory clubs may not require up-front financial contributions from members, but rather a mutual agreement to adopt regulatory measures that create markets for

[46] *See* James M. Buchanan, *An Economic Theory of Clubs*, 32 ECONOMICA 1 (1965).
[47] Todd Sandler & John Tschirhart, *Club Theory: Thirty Years Later*, 93 PUB. CHOICE 335 (1997).

new technologies. Most clubs are voluntary; members choose to join only because they anticipate that the club good is more valuable than membership fees and other requirements.[48]

In theory, stable regimes of cooperation can form around the provision of club goods because the ability to exclude nonpayers from accessing the good makes policing free riding significantly easier. As long as monitoring and verification systems are established to ensure that members abide by their responsibilities and an exclusionary mechanism ensures that nonmembers cannot access the club good without paying club dues, actors will not have an incentive to defect. This dynamic is the inverse of that which is present in regimes to secure pure environmental and other public goods. In such regimes, incentives favor free riding because the goods are not excludable; actors have strong reasons to withdraw from cooperation if they do not have to bear the costs of cooperation while still accessing its benefits.

Because greenhouse gas reduction is an inherently non-excludable good, it cannot be a club good and thus cannot be the basis for stable club cooperation. As such, climate clubs must form around self-interested, non-climate incentives, such as those discussed in the previous section. That the co-benefits of these clubs (e.g., greenhouse gas emissions)[49] are themselves common goods and therefore subject to free riding, has no effect on the stability of the club, as it is based on the excludable non-climate club good.

A range of excludable non-climate benefits and incentives can be mobilized for initiatives which also reduce greenhouse gas emissions. For example, a club could form around research and development; participants would contribute resources to research-and-development efforts and jointly reap the benefits of the knowledge and technology created. As long as strong intellectual property protections exist to ensure that participants retain exclusive control of the products of joint research and development, cooperative arrangements can form the basis for stable cooperation on projects with significant non-climate incentives. Cooperative research-and-development measures can access economies of scale that makes them more appealing than solitary non-cooperative research and development; cooperation allows participants to pool costs, share risk, and leverage synergies.

Further, clubs can form around the scale economies that come from the mutual provision of information and technical assistance. Actors can cooperate by pooling data on the performance of low-emissions technologies, disseminating best-practice techniques, and providing joint training and mutual assistance. Cooperation on these learning-by-doing measures is more cost effective and faster than developing them unilaterally. It also reduces the risks of information asymmetry. However, strong exclusionary mechanisms are required to ensure that nonmembers do not have access to confidential club information and resources.

Clubs can also form around network effects, generated by positive feedback loops where the more members that enact a rule or practice a behavior, the more each member benefits. For example, technical harmonization clubs can reduce transaction costs associated with trade and provide economic benefits to members that agree to standards and protocols on green technologies. Regulatory clubs, governmental or private, may adopt common regulatory standards that create markets for energy-

[48] RICHARD CORNES & TODD SANDLER, THE THEORY OF EXTERNALITIES, PUBLIC GOODS, AND CLUB GOODS 188 (1986).

[49] For instance, cooperation on regional air pollution may also reduce health risks from particulate pollution; reducing emissions of chlorofluorocarbons (CFCs), which are greenhouse gases, also reduces incidences of skin cancer caused by ozone depletion.

efficient technologies, which encourage their development and provide member countries with first-mover advantages in shaping new markets. Such clubs would require monitoring and exclusionary arrangements to deter free riders and ensure that countries are abiding by club rules. Members may be required to provide detailed reports on their implementation of the scheme and allow independent inspectors to ensure that producers are adhering to technical standards.

A number of issues arise in terms of creating and administering clubs that may limit their efficacy. First, as described above, a central issue is ensuring that the goods produced by the club are excludable and limited to club members. This requires creating an effective exclusionary mechanism; otherwise the regime will fall prey to the collective action problems that plague public goods. Exclusion mechanisms will vary based on the nature of the club. They may, for example, include intellectual property protections that only allow member countries to license patented technologies or confidentiality agreements that require members to keep any data and other information developed proprietary. A club also must protect against shirking, or the ability of members to claim to adhere to club requirements but fail to live up to promises. Clubs that derive their benefit from network effects particularly need to ensure that members are playing by agreed-upon rules and that any deviators are caught and sanctioned either by expulsion from the club or through other agreed-upon measures. [50]

Another potential problem is collective decision-making: As the size of a club increases, members are more likely to have divergent interests, which would increase the decision-making costs of club good production. If club decisions require consensus, then each new member is vested with an effective veto. Since a member's benefit from club participation depends on the ability of the club good to conform to its preferences, members may see their benefit from cooperation decrease as a club grows, becomes more diverse, and begins to produce services that do not match its specific interests.[51] This problem may be addressed by creating new clubs, but the problem may still limit the extent of greenhouse gas reductions.

A final issue is the question of who bears the initial startup costs of club formation.[52] Political entrepreneurs are necessary to initiate the creation of the institutional structures necessary to ensure stable club operation. Startup costs must not be so high such that they disincentive club creation. This dynamic may require climate clubs to piggyback on existing organizations, which would reduce startup costs.

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[50] The creation of regulatory or standards-based clubs creates the potential that preferential trade rules among club members may contravene to WTO rules. It is not clear whether the exception concerning regional trade agreements may be used for thematic, regionally based clubs. However, it is beyond the scope of this paper to consider trade regulatory issues. For a preliminary discussion of the trade law issues surrounding this type of response, see Patrick Low, Gabrielle Marceau & Julia Reinaud, *The Interface Between the Trade and Climate Change Regimes: Scoping the Issues* 6 (World Trade Org., Working Paper No. ERSD-2011-1, 2011), *available at* http://www.wto.org/english/res_e/reser_e/ersd201101_e.pdf. [BB][CC]

[51] *See* MASAHIRO KAWAI, PETER A. PETRI & ELIF SISLI-CIAMARRA, ASIA IN GLOBAL GOVERNANCE: A CASE FOR DECENTRALIZED INSTITUTIONS (Asian Dev. Bank Inst., Working Paper No. 157, 2009).

[52] *See* Section VI.B *infra* for a discussion of start up costs.

B. Building Block Regimes Based on a Club Strategy

The following are examples of clubs[53] that might be developed that would provide economic or other non-climate excludable benefits to members while generating mitigation as a public good co-benefit.

Government-led club for harmonization of existing technical standards for energy efficient/low greenhouse gas technologies, goods, and services: Firms and their governments would benefit from increased trade in green goods and services. While relatively high tariffs impede such trade, the existence of different and often inconsistent technical standards in different countries may be an even greater barrier. This has, for example, been a serious problem for wind turbine components.[54] There could be large economic gains from increased trade through harmonization of technical standards for energy-efficient and low-emissions technologies, goods and services, and of standards and protocols for measuring and reporting energy use and greenhouse gas emissions.[55] These programs often include or are linked with certification programs for compliance with standards, protocols, and methodologies. Such arrangements, based on technology standards, can expand markets, lower costs, widen competition, and promote innovation and diffusion.[56] They also could thereby reduce greenhouse gas emissions by decreasing the cost and improving performance (e.g., energy efficiency) of goods and services and making the goods and services more widely available. A small club of developed and developing countries that are important players in the sector could reap significant economic and strategic benefits by launching harmonization efforts. If the venture was successful, other countries would have strong incentives to join the club and expand it. The standards adopted by an expanded club would enjoy WTO recognition by virtue of the Technical Barriers to Trade Agreement, which accords presumptive validity to technical standards adopted by relevant international organizations.[57] These initiatives could initially concentrate on certain sectors, such as wind, solar, and grid technologies, which are of particular interest to key countries. The scope could later be expanded.

A government-led club to adopt new performance-based green product regulatory standards to promote innovation and expand markets: In addition to harmonizing existing technical standards, key countries also might form technology clubs focusing on energy-efficiency, energy security, and greenhouse gas mitigation technologies by improving and standardizing performance standards for selected technologies with the aim of "technology forcing" and market creation. The incentive would be the economic benefits to the members and their industries from expanded markets. For example, carbon capture and storage (CCS) technology exacts a large performance and cost penalty, reducing

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[53] We discuss a number of others in Richard Stewart et al., *A New Strategy for Global Climate Protection.* CLIMATIC CHANGE (forthcoming 2013).

[54] In particular, technical difference between turbine components has limited their interoperability. *See* Vivian Wai-yin Kwok, *Weaknesses In Chinese Wind Power*, FORBES (July 20, 2009), http://www.forbes.com/2009/07/20/china-wind-power-business-energy-china.html; MIKE WOEBBEKING, THE NEW GUIDELINES FOR THE CERTIFICATION OF WIND TURBINES (Gerson Lehrman Renewables Certification, 2010).

[55] *See* INTERNATIONAL CENTRE FOR TRADE AND SUSTAINABLE DEVELOPMENT FOSTERING LOW CARBON GROWTH: THE CASE FOR A SUSTAINABLE ENERGY TRADE AGREEMENT 47 (2011), http://ictsd.org/i/publications/117557/; Arunabha Ghosh, *Seeking Coherence in Complexity?: The Governance of Energy by Trade and Investment Institutions*, 2 GLOBAL POL'Y 106 (2011); Int'l Center for Trade and Sustainable Dev., *APEC Leaders Pledge to Increase Cooperation on EGS Trade*, 11 BRIDGES TRADE BIORES 1, 1–2 (Nov. 14, 2011), http://ictsd.org/i/news/biores/118312/.

[56] *See* BARRETT, *supra* note 5, at 393–97.

[57] INT'L STANDARDS ORG., INTERNATIONAL STANDARDS AND "PRIVATE STANDARDS" 4 (Feb. 2010).

total electric generation efficiency by about a third when applied to pulverized coal combustion (the currently dominant combustion technology). But higher efficiencies are feasible, and they could be encouraged by incentivizing investment, via regulation and financing, for developing advanced pre-combustion CCS technologies, such as integrated gasification combined cycle (IGCC) plants that increase efficiency and simplify carbon dioxide storage.[58] Further, the participation of governments in the clubs may allow for agreed, targeted subsidies where the clubs produce benefits in the governments' interests.

Government-led renewable energy research and development clubs: Major jurisdictions that compete for a global market position in developing energy-efficiency and renewable-energy technologies might benefit from establishing cooperative research-and-development clubs in specific sectors. Joint research and development would realize economies of scale, pool and diversify the risks involved in innovation, and could tap complementarities in the diverse know-how and participant capabilities. The club arrangements would have to include intellectual property or confidentiality arrangements to restrict the benefits of innovation and the resulting market and trade benefits to the club members and their firms as well as agreements on each member's contributions to the joint effort. They also could include technology transfer programs that include financing and regulatory arrangements.[59]

One example is a CCS technology club. Even with aggressive development of renewables, China and India are projected to increase coal combustion on a massive scale. Here, the United States and European Union have a significant knowledge advantage; China has advantages in terms of ability to manufacture and implement the needed technology cheaply, but currently lacks strong incentives to implement it domestically. A CCS club, already incipient due to European Union-China joint demonstration projects, could speed development of the technology, address siting and storage issues, and provide expanded implementation in China, while allowing the European Union to share in credit for emissions reductions (creditable under the Kyoto Protocol) and to share in eventual profits from selling the technology (e.g., eventually to the United States or Australia).

Technology clubs could participate in the nascent Climate Technology Center and Network (CTCN) that resulted from the 2010 UNFCCC Conference of the Parties in Cancun.[60] These clubs could act as sector-specific nodes in the network, leading to information sharing on technology development and transfer across sectors. Other examples include clubs built around grid technologies, offshore wind energy technologies, and biofuels.

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[58] *See* Hengwei Liu et al., *Strategic Thinking on IGCC Development in China*, 36 ENERGY POL'Y 1 (2008); ASIA SOC'Y CENTER ON U.S.-CHINA RELATIONS, CENTER FOR AM. PROGRESS MONITOR GRP. & LAWRENCE LIVERMORE NAT'L LAB., A ROADMAP FOR U.S.-CHINA COLLABORATION ON CARBON CAPTURE AND SEQUESTRATION (Nov. 2009); Richard Morse, Varun Rai & Gang He, *The Real Drivers of Carbon Capture and Storage in China and Implications for Climate Policy*, (Stanford Univ. Program on Energy & Sustainable Dev., Working Paper No. 88, Aug. 2009).

[59] For example, India and the United States have entered into an memorandum of understanding to cooperate on the development of biofuels and related technology transfer issues. NDRC, THE GREENING OF US-INDIAN RELATIONS 15 (2011), *available at* http://www.nrdc.org/international/india/files/usindiagreening.pdf.

[60] The Climate Technology Centre and Network, run by the United Nations Environment Programme and the United Nations Industrial Development Organization, is envisioned to bring together various international stakeholders to facilitate the creation and diffusion of green technologies. *See* Climate Technology Centre and Network, http://unfccc.int/ttclear/jsp/CTCN.jsp

Government-led research and development, trade, and regulatory clubs for development of specific technology sectors: A more ambitious strategy for a government led-technology club would combine, in the context of a specific technology sector, two or more of the several different types of initiatives discussed above. For a specific sector such as offshore wind or advanced solar arrays, a small number of countries could agree on joint research and development, the adoption of performance-based regulatory standards, and leadership in harmonizing technical standards, lowering tariffs, and addressing other barriers to expanded trade in the sector. Each of these activities could be the province of a separate club, but combining them could create synergies that would expand trade, innovation, markets, and diffusion even more, as well as create more issues for horse trading that could facilitate a deal. The club also might aim to mutually reduce or eliminate subsidies otherwise allowed under WTO for new industrial sectors for members of the club. It would create an alternative to the current problematic situation exemplified by photovoltaic (PV) cells; China's significant subsidization of the PV sector may lead to short-term economic advantages but, in the long term, its actions may reduce the diversity of the PV market and stultify technological progress.[61] Phasing out fossil fuel subsidies could be linked with such initiatives.[62]

Industry-led clubs for resource efficiency in industrial processes: Rather than countries, transnational groups of firms in key industry sectors, such as aluminum, cement, paper and pulp, textiles, iron, and steel, might form clubs aimed at meeting targets for energy efficiency and other cost savings that also would generate greenhouse gas emissions reductions. These clubs could include joint research-and-development relationships through which firms also could share experience and knowhow in developing techniques. Knowledge sharing could encompass changes in production arrangements and materials management techniques as well as deployment of new technologies to reduce energy use and promote resource efficiency. The design could take an experimentalist strategy that would include performance benchmarking and tracking.[63] The club good would be the detailed knowledge gained from experience regarding the performance and potential of different techniques and sharing of knowhow, which would be restricted to the club members. Specific examples include the following:

> *Aluminum*: Cooperation among members of the International Aluminum Institute (IAI) has already reduced perfluorocarbon (PFC) emissions per tonne by more than 90% since 1990.[64] Firms could use the existing IAI framework to channel further cooperation on new energy-efficiency measures: first, by providing technical assistance on best practices, and second, by

[61] Diane Cardwell & Keith Bradsher, *U.S. Will Place Tariffs on Chinese Solar Panels*, N.Y. TIMES, Oct. 10, 2012, at B3.
[62] In 2009, the G20 member nations agreed to gradually phase out fossil fuel subsidies. Progress has however been disappointing. *See* Thijs Van de Graaf & Kirsten Westphal, *The G8 and G20 as Global Steering Committees for Energy: Opportunities and Constraints*, 2 GLOBAL POL'Y 19, 28 (2011) .
[63] *See, e.g.*, BATTELLE, TOWARDS A SUSTAINABLE CEMENT INDUSTRY: COMMISSIONED BY THE WORLD BUILDING COUNCIL FOR SUSTAINABLE DEVELOPMENT (2002), *available at* http://www.wbcsd.org/web/publications/batelle-full.pdf; Worldsteel Association, *Worldsteel Climate Change Initiatives: Presentation to International Workshop on International Standards to Promote Energy Efficiency and Reduce Carbon Emissions, 17th March 2009*, available at http://iea.org/work/workshopdetail.asp?WS_ID=400, 29 November 2011.
[64] INT'L ALUMINUM INDUS., RESULTS OF THE 2010 ANODE EFFECT SURVEY 1 (Aug. 2011).

channeling research-and-development funding into innovations such as fluid bed technology and higher amperage cells.[65]

Textiles: A variety of strategies and technologies exist for enhancing energy efficiency at each stage of the textile production chain, many of which are cost effective and pay for themselves within two years by reducing energy consumption. Significant financing, technical, and informational barriers to realizing such gains could be overcome by sector-based clubs with government support.[66]

Club for greenhouse gas monitoring and reporting protocols and technologies: Public and private actors could develop robust, comprehensive energy use and greenhouse gas monitoring and reporting regimes. Having reliable, consistent, and accessible information on efficiency and emissions can be economically valuable for governments, firms, and consumers concerned about using energy and resources efficiently and also could be valuable to the subset of firms and consumers concerned about climate change mitigation. The provision of such information and the development of information systems present a business opportunity for firms and NGOs to develop reporting methods, such as software and hardware for remote reporting. These reporting clubs also could involve public actors whose endorsement would signal the reliability and acceptability of the information generated.[67] For example, the reporting bureaucracy within the UNFCCC might view the development of specialized sector-based reporting standards as a way to strengthen the reporting regime and the political support for it.

An example of such a club is the Greenhouse Gas Protocol, which provides a widely used, standardized system for organizations to determine and report their greenhouse gas systems, a form of corporate accounting tool.[68] Similar protocols could be used for tracking and reporting gains in energy efficiency, which could then be publicized through energy efficient/low greenhouse gas labeling and certification standards and programs for goods and services, including in specific sectors.[69]

Government clubs for linking market-based systems for controlling GHG emissions represent another promising candidate for a club regime. Emissions trading systems for conventional pollutants

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[65] *See* Subodh Das, *Achieving Carbon Neutrality in the Global Aluminum Industry*, 64 J. OF METALS 285 (2012) ; BCS CONSULTING, U.S. ENERGY REQUIREMENTS FOR ALUMINUM PRODUCTION: HISTORICAL PERSPECTIVE, THEORETICAL LIMITS, AND NEW OPPORTUNITIES (Feb. 2007).

[66] *See, e.g.*, Ali Hasanbeigi, *Energy-Efficiency Improvement Opportunities for the Textile Industry* (Lawrence Berkeley Nat'l Lab., Working Paper No. LBNL-2970E, Sept. 2010), *available at* http://www.energystar.gov/ia/business/industry/downloads/EE_Guidebook_for_Textile_industry.pdf; Khalil Elahee, *Heat Recovery in the Textile Dyeing and Finishing Industry: Lessons from Developing Economies*, 21 J. ENERGY S. AFR. 9 (2010); N. Nagesha & P. Balachandra, *Barriers to Energy Efficiency in Small Industry Clusters: Multi-Criteria-Based Prioritization using the Analytic Hierarchy Process*, 31 ENERGY 1969 (2006).

[67] For example, the Carbon Trust in the United Kingdom is a quasi-governmental agency with participation by government ministries. A similar situation could be envisioned for the EPA in sectoral reporting, such as for aluminum, where the agency already has a voluntary program with industry. See *supra* note 39.

[68] The Greenhouse Gas Protocol is a joint project of the World Resources Institute and the World Building Council for Sustainable Development that publishes reports and develops user-friendly tools to calculate lifecycle emissions. *Greenhouse Gas Protocol*, http://www.ghgprotocol.org (last visited Mar. 24, 2013).

[69] For example, the Carbon Trust Footprinting Certification Company in the United Kingdom verifies the carbon footprints of goods and services with reference to PAS 2050 and the Greenhouse Gas Protocol Product Life Cycle Standard. Companies that meet the standard are given the right to use the Carbon Trust's easily identifiable Carbon Reduction Label on their products. *Certification*, CARBON TRUST, http://www.carbontrust.co.uk/cut-carbon-reduce-costs/promote/carbon-trust-footprinting-company/pages/default.aspx (last visited Mar. 24, 2013).

and for greenhouse gas emissions have been adopted or are in the process of being adopted by different jurisdictions, including the European Union, EU member states, other countries such as Australia, and subnational jurisdictions such as California. Greenhouse gas emissions trading systems are found in jurisdictions where there are pockets of strong support for mitigation. Jurisdictions with one of the trading programs could form a club or group of clubs to link similar systems such that emissions credits could be traded across the linked systems. Such linkages would expand the scope of the trading market and thereby promote greater efficiency and innovation in emissions reductions.

IV. Using Linkage and Leveraging Strategies to Develop Building Block Regimes

The linking and leveraging strategy for building block regimes seeks to take advantage of situations where there are existing institutions or institutional relations with objectives other than mitigation. New activities that would reduce greenhouse gas either fit within the institutions existing missions or existing missions can feasibly be modified or extended to include such activities. There are pockets of mitigation support within institutions that can be tapped by policy entrepreneurs to catalyze and support institutions undertaking such activities. This strategy seeks to use such pockets of support to leverage existing institutions by linking emissions-reducing activities to the institutions' programs. The strategy is opportunistic, deploying a form of policy judo.

Examples of this strategy include the following:

Extending the Montreal Protocol to regulate greenhouse gases related to ozone depletion. The Montreal Protocol, which regulates ozone depleting substances, could be extended to include halocarbon substitutes, such as HFCs. HFCs are potent greenhouse gases (but do not deplete ozone) whose production was stimulated by controls (particularly the Montreal Protocol) on ozone depleting substances.[70] The Montreal Protocol also could be extended to include other greenhouse gases such as nitrous oxide, a long-lived greenhouse gas which also depletes ozone.[71] Discussions already are underway to expand the scope of the Montreal Protocol to include non-depleting substitutes. At the same time, very preliminary suggestions have been made to control nitrous oxide, which would become the primary ozone depleter if halocarbon emissions were completely eliminated.[72] The Montreal Protocol already has produced far more greenhouse gas reductions than the Kyoto Protocol, even though such benefits are merely incidental to the Montreal Protocol. And although the primary aim of controlling HFCs would be limiting greenhouse gas emissions rather than protecting the ozone layer, countries and firms might well agree on such a limited and targeted undertaking, particularly if there is a potential to develop substitutes. Ways will have to be found, however, to overcome opposition by China and India, possibly through side payments

Bilateral and regional air pollution control programs. Existing institutionalized forms of regional cooperation among countries, including on environmental or economic matters, could be extended to include regional programs for coordinated control of conventional air pollutants that cause significant local and regional problems, including health problems, and which would reduce greenhouse gas emissions as a co-benefit. Exacerbation of transboundary regional air pollution is already an issue in

[70] *See* Guus J. M. Velders et al., *The Importance of the Montreal Protocol in Protecting Climate*, 104 NAT'L ACAD. OF SCI. 4814 (2007) .

[71] Mario Molina et al., *Reducing abrupt climate change risk using the Montreal Protocol and other regulatory actions to complement cuts in CO_2 emissions*, 106 NAT'L ACAD. OF SCI. 20616 (2009).

[72] The sources of nitrous oxide include certain industrial processes, fertilizer application, some combustion processes, and sewage outfalls. *See* Velders et al., *supra* note 70.

Europe, North America, South Asia, and East Asia, involving almost all the major economies (with the possible exception of Brazil, Indonesia, and Malaysia). Air pollution control agreements of various stripes currently involve Europe and North America (LRTAP), and various United States-Canada, and United States-Mexico agreements.[73] Once established, such regimes could be extended to provide monitoring, reporting, and verification for greenhouse gas emissions reductions that are incidental to their main purpose. New agreements could be developed in East Asia, South Asia, and trans-Pacific (United States-China) with greenhouse gas emissions monitoring, reporting, and verification architecture embedded from the outset. The purpose would be to provide the basis and create support for future regulatory recognition, offset trading, and, eventually, full greenhouse gas emission trading programs.

Two key warming agents, tropospheric ozone and black carbon particulate, could be reduced by such agreements. Reductions of carbon dioxide also could occur as a result. Furthermore, by inducing such agreements to explicitly consider side effects of control actions on carbon dioxide and other greenhouse gases, certain control strategies**,** notably scrubbing of sulfur dioxide and nitrogen oxide, that have the effect of increasing the emissions of greenhouse gases would be eliminated or their prominence reduced**.** Developed countries with an interest in mitigation could provide substantial financial assistance to catalyze and support regional air pollution control programs in developing country regions, such as Southeast Asia, where to date ASEAN has been rather ineffective in controlling regional haze.[74]

Including Greenhouse Gas Reducing Activities in Development Assistance and Financing Programs. There are many opportunities to mainstream emissions reductions within development aid and finance by leveraging support for mitigation from developed country development assistance ministries, multilateral development banks, and international financial institutions. A number of such initiatives already have been undertaken and many more could be developed. Some examples include the following:

> *Energy Efficiency/Climate Financing Arrangements*: A variety of existing programs (public, private, and hybrid) promote investment in energy-efficient and low-emission technologies and infrastructure, especially in developing countries.[75] Examples include World Bank Carbon Investment Funds, export credit agency policies favoring Green Energy projects, green stock indexes, Asia-Pacific Partnership on Clean Development, and the Equator Principles.
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> *Black Carbon /Cookstoves*: The Climate and Clean Air Coalition, a U.S. State Department-led country coalition, is using development money (from developed country development agencies) to develop cleaner burning cookstoves.[76] Within the developing world, household

[73] *See, e.g.*, Canada-United States: Agreement between the United States of America and Canada on Air Quality, U.S.-Can., Mar. 13, 1991, 30 I.L.M. 676 (1991); Convention on Long-Range Transboundary Air Pollution, Economic Commission for Europe, Nov. 13, 1979, 18 I.L.M. 1442 (1979).
[74] *See, e.g.*, UNEP, Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia of 1998, *available at* http://www.rrcap.ait.asia/male/. For an overview of the declaration, see INT'L CENTRE FOR INTEGRATED MOUNTAIN DEV. http://www.icimod.org/?q=467. For an example of climate-related cooperation efforts, see Int'l Center for Trade & Sustainable Dev., *supra* note 55.
[75] *See* Christopher Wright, *Export Credit Agencies and Global Energy: Promoting National Exports in a Changing World*, 2 GLOBAL POL'Y 133 (2011); Peter Newell, *The Governance of Energy Finance: The Public, the Private and the Hybrid*, 2 GLOBAL POL'Y 94 (2011).
[76] Fact Sheet, U.S. State Dep't, The Climate and Clean Air Coalition To Reduce Short-Lived Climate Pollutants Initiative (Feb. 16, 2012), http://www.state.gov/r/pa/prs/ps/2012/02/184055.htm; Hillary R. Clinton, U.S. Sec'y

cookstoves are a major source of black carbon, a short-term climate forcer. Cleaner burning cookstoves require less fuel, produce significantly less black carbon, and improve air quality within dwellings.

Sustainable forestry and agriculture programs with common standards: Extend development assistance programs that include activities for sustainable forestry and agriculture, such as Reducing Emissions from Deforestation and Forest Degradation (REDD+), to include arrangements that harmonize social and environmental standards and greenhouse gas monitoring, reporting, and verification protocols and programs. Such harmonization across programs would facilitate benchmarking, information sharing, and experimentalist learning, similar to some of the club arrangement discussed in Section IV. [77]

V. Building Block Regimes Using Dominant Actor Strategies

As outlined above, jurisdictions that are strongly committed to mitigation and that command a large share of international trade in a given sector may be able to exploit their market power by imposing regulatory requirements on goods and services entering their markets, such as greenhouse gas emissions standards, energy-efficiency mandates, and other climate-related measures. Because of economies of scale and transactions costs, manufacturers and service providers may have strong economic incentives to follow those requirements globally, a phenomenon known as the California or Brussels Effect.[78]

Alternatively, initial adoption by one or a few major jurisdictions could produce, through domino effects, emulation by other jurisdictions and emergence of global arrangements for uniform regulatory standards in specific regulated sectors. Regulation by a jurisdiction with a significant share of the global market also may lead other jurisdictions to adopt the same or even higher standards ("race to the top") for reasons of global competitiveness.[79] This logic seems to have been at work in the recent adoption by the United States, with the support of U.S. auto manufacturers, and by China of more stringent fuel economy standards.

Dominant firms in a global sector might respond to unilateral imposition of regulatory requirements by a market-dominant jurisdiction by forming an industry regulatory club that would enable them to maintain a united front in dealing with the regulating jurisdiction and have a greater say in the regulatory system that would eventually emerge globally.

Alternatively, a dominant firm or firms may support regulation by dominant countries if it gives them a competitive advantage. Thus, in the context of the Montreal Protocol, du Pont supported or at least acquiesced in the U.S. push for controls on CFCs in part because du Pont was further along in developing substitute products.[80] Dominant firms might even adopt such standards on their own

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of State, Remarks at the Climate and Clean Air Coalition To Reduce Short-Lived Climate Pollutants Initiative (Feb. 16, 2012), http://www.state.gov/secretary/rm/2012/02/184061.htm.

[77] *See* REDD+ SOCIAL AND ENVIRONMENTAL STANDARDS, http://www.redd-standards.org/.

[78] *See* DAVID VOGEL, THE MARKET FOR VIRTUE: THE POTENTIAL AND LIMITS OF CORPORATE SOCIAL RESPONSIBILITY (2005); BARRETT, supra note 5, (discussing MARPOL strategy for pollution control from ships); Anu Bradford, *The Brussels Effect*, 107 NW. U. L. REV. 1 (2013).

[79] *See* Vogel, *supra* note 33.

[80] Developing country firms would be seriously disadvantaged by such controls. The developing countries were induced to join the Montreal scheme by granting them a 10-year compliance grace period. Trade sanctions would

through a transnational regulatory club like those discussed in Section III, seeking to gain a competitive advantage over existing firms and potential new entrants. This could occur even if these dominant firms would not act for the sake of climate protection itself. For example, considerations of competitive advantage may have motivated dominant firms to adopt energy-efficiency standards in the global aluminum industry.

A final variant could involve the use of both club and dominant actor scenarios. For example, a group of actors with similar or complementary strategic positions in a given sector could form a club to foster the adoption of product, performance, or service standards in order to gain a mutual advantage. Once the members of the club establish the standard, the club would effectively operate as a dominant actor and could propagate the standard throughout the sector. Firms in a sector subject to regulation by one or a few dominant jurisdictions may respond by developing a rival, voluntary regulatory club that would further harmonize regulatory standards on their own terms. The club also might enlist other countries to join in its effort.

Examples of dominant actor strategies include the following:

Aviation Emissions: The European Union has extended its ETS regulation of carbon dioxide emissions to flights by foreign air carriers that take off or land within the European Union. The regulation covers all carbon dioxide emitted during such flights, including portions over international waters and in foreign countries. [81] The regulation reflects EU frustration with the lack of progress in negotiating an international agreement on emissions under the auspices of the International Civil Aviation Administration (ICAO), a logical venue for establishing such standards. The European Union evidently is hoping to use its market leverage to either force carriers to comply with its standards to induce international agreement on comparable standards. Carriers in the United States and major developing countries, however, have refused to comply and have opposed the EU initiative before ICAO.[82] Indeed, the European Union has agreed to postpone the inclusion of foreign carriers until after the 2013 ICAO General Assembly, assuming the ICAO develops a comparable international standard.[83]

Maritime pollution—black carbon in Arctic: One or more major port/trading jurisdictions could impose fuel efficiency or air pollution emissions regulations on ships. The International Maritime Organization (IMO) could serve as the institutional base for global regulatory standards in the international shipping sector, an action it has already taken for sulfur dioxide emissions.[84] Dominant

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deny developing country firms access to EU and U.S. markets and to financial assistance for the transition to substitutes. *See* BARRETT, *supra* note 5.

[81] The EU ETS Aviation Directive, which came into force 1 January 2012, requires all carriers landing at a European airport (except for small carriers with very few daily flights) to surrender EU ETS permits for the emissions from the full length of the incoming or outgoing flight. Foreign carriers, and governments, are arguing that it should only be on the portion within EU airspace. *See* Council Directive 2008/101, 2008 O.J. (L 8) 3 (EC) (mending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community).

[82] Doug Cameron, *Airline Industry Raises Heat Over EU Scheme*, WALL ST. J., Mar. 12, 2012, *available at* http://online.wsj.com/article/SB10001424052702304537904577276434121518006.html..

[83] European Comm'n, *Proposal for a Decision of the European Parliament and of the Council derogating temporarily from Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Community*, at 2-3, COM (2012) 697 final (Nov. 20, 2012).

[84] SCOTT BARRETT, ENVIRONMENT AND STATECRAFT: THE STRATEGY OF ENVIRONMENTAL TREATY-MAKING 94, 264 (2011).

port/coastal states successfully have used this approach to impose design and safety standards for ships. For example, dominant ports and coastal states required large tankers to use double hulls. The IMO later adopted this requirement as a global standard.[85] Such a strategy could be applied to mitigate black carbon emissions from ships. Black carbon emissions from incomplete diesel combustion on ships act as a powerful forcing agent. These emissions cause global warming when deposited on snow cover and ice sheets by reducing the albedo effect and hastening melting.[86] As climate change-induced Arctic ice melting opens the region to extensive maritime traffic, controlling carbon black from ships is becoming a priority.

VI. Developing Effective Transnational Building Block Regimes for Reducing Greenhouse Gas Emissions

A. Identifying opportunities and designing appropriate institutional structures for building block regimes

Implementing the building block approach will require institutional innovators to identify the most promising opportunities for building block regimes; to design institutional arrangements that secure effective cooperation among relevant actors in the various specific sectors or fields; and to mobilize key actors to organize the regime. In each case, the regime founders must set an agenda, identify and enlist the interest of the key players, negotiate arrangements, deal with potential free riding, and overcome other barriers to securing participation and to forming a well-functioning regulatory regime.[87] Meeting these challenges requires highly demanding analytic and empirical work, informed by rational choice theory and the lessons of international and transnational political economy.

The first step is prospecting: The analysis must consider the circumstances and the structure of incentives among potential players in different sectors and fields; whether the sectors and fields could support transnational regulatory or financial cooperation or coordination that has climate change co-benefits; the potential suitability of each of the three basic types of building block approaches; and the relative incentives, resources, and competencies of different types of actors and the potential for combining them through collaborative arrangements.[88]

After one or more promising candidates for regime development are identified, the second step is to design and develop institutional structures for cooperation and coordination in specific fields. These structures must be designed to effectively mobilize players' incentives by delivering benefits that ensure participation while also promoting activities that reduce greenhouse gas emissions. There must be arrangements for governing the regime; financing joint operations; monitoring players' the performance toward achieving the regime's objectives; monitoring the performance of the regime as a

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[85] Press Release, European Comm'n, Maritime safety: IMO introduces new double-hull requirements at world-wide level to close the gap with new EU safety rules (Dec. 5, 2003).
[86] Surabi Menon et al., *Black carbon aerosols and the third polar ice cap*, 9 ATMOSPHERIC CHEMISTRY & PHYSICS DISCUSSION 26593 (2010).[LE: If you have a pincite for this quote, please add it. I am having trouble accessing the article at the following link: http://www.atmos-chem-phys.net/10/4559/2010/acp-10-4559-2010.html - BR: That wasn't a quotation, just a stray mark.]
[87] *See* Kenneth W. Abbott & Duncan Snidal, *The Governance Triangle: Regulatory Standards Institutions and the Shadow of the State*, in THE POLITICS OF GLOBAL REGULATION 44 (Walter Mattli & Ngaire Woods eds., 2009).
[88] *See id.*, at 46–53.

whole; and addressing participants' failure to adhere to the regime's norms and requirements. These requirements will differ significantly depending on which building block strategy is followed and will likely be more extensive in the case of club regimes than in the case of linkage and dominant actor regimes. They will rarely take the form of legal binding agreements among the participants. Regime participants will often prefer the flexibility that other approaches provide so long as adequate institutional arrangements to deal with defection are developed. But in some areas, such as R&D clubs that will require agreements regarding intellectual property and trade secrets, legally binding agreements may be needed. Academics and policy think-tanks can contribute by analyzing experience under existing transnational regulatory regimes for environmental protection, trade regulation, regulation of finance and investment. Economic integration and development should be studied for analogies and insights in prospecting and developing various specific building block regimes and for taking corrective action if they do not.

B. Regime Sponsors and Catalysts

One or a few institutional players must take the lead in organizing a regime. The transaction costs of organization will generally be greater in the case of club regimes, especially if the club involves a substantial number of members. Where organizational costs are substantial, one or more regime founders must generally bear the startup costs or the regime may not be formed even though it would deliver significant net benefits to participants and to the climate once it has launched.

In the case of bilateral clubs or those involving a small number of countries or firms, such as joint research and development regimes, the players can cope with the organization costs if they can negotiate the basic deal. In the case of trade liberalization schemes, a few countries with a sufficient share of the market may be willing to shoulder the startup costs, and would benefit as more countries subsequently join. Unlike a greenhouse gas emissions treaty, such measures generally would not be legally binding under international law and often not legally binding at all; would not involve the major economic and political risks posed by binding economy-wide constraints on emissions; and would be reciprocal in character, easing competitiveness and equity concerns. In the case of industry sector clubs of firm, existing trade associations may serve as the organizers. Where regimes must involve a larger number of participants at the outset or participants of different types, an existing international organization, such as a multilateral development bank may have to lead the regime, such as by supplying resources. Building block regimes also could be sponsored or supported by institutional components of the existing global climate regime complex, [89] by the Major Economies Forum, the G-8, or G-20, [90] or by strongly institutionalized networks of domestic government officials, international organizations, firms, and NGOs in specific sectors.[91]

Startup costs are likely to be relatively low in the case of many linkage regimes, because these operate by grafting climate-beneficial programs onto existing institutions with missions that can accommodate new programs that will reduce greenhouse gas emissions. For example, international development aid and finance bodies and international financial institutions can accommodate

[89] Robert Keohane & David G. Victor, *The Regime Complex for Climate Change* (Harvard Kennedy Sch. Belfer Center for Sci. & Int'l Affairs, Discussion Paper 10-33, Jan. 2010).
[90] For discussion of the G8 and G20's role in global energy governance, see Thijs Van de Graaf & Kirsten Westphal, *supra* note 62.
[91] The role of national governments, firms, and civil society organizations in developing regulatory standard-setting regimes in a wide variety of global regulatory fields is examined in Abbott & Snidal, *supra* note 89. For discussion of their role in climate, see Abbott, *supra* note 27.

programs that channel resources to developing countries to develop green energy technologies and provide energy security to the rural poor as part of their development mission. Thus, they can promote more energy efficient patterns of development and, in turn, can increase global demand for energy-efficient goods and services. They also might, for a number of reasons, adopt policies and channel resources to programs that are focused on reducing greenhouse gas emissions. Recipient developing countries may accept such programs if they contribute to development and poverty alleviation and help stimulate foreign private investment. Such program also could reduce costly energy imports (a major concern in Egypt, for example). Developed-country governments might support or acquiesce to such initiatives, because they can help meet demands from other states and environmental constituencies for mitigation. Such initiatives also can secure economic benefits from subsidization of purchases by developing countries of developed country greenhouse gas emissions-related goods and services. When the configuration between the host institution and the new program and the incentives of the key players is favorable, initiative from a few key actors may be able to accomplish linkage of the new program and thereby leverage the resources of the institution to promote climate-beneficial activities. Political or professional elites within development aid and finance bodies, other relevant international organizations, or key countries may favor steps to support climate protection and supply the push to add them to the host institution's agenda.

In other linkage strategy examples, adding greenhouse gases to the Montreal Protocol's regulatory regime or extending regional air pollution programs to target conventional pollutants through measures that reduce greenhouse gas emissions may be a logical extension of existing activities that is favored by political and professional elites. In other instances, such as developing a regional air pollution control regime in a region where none exists (e.g., Southeast Asia), reliance on existing regional institutions such as ASEAN alone may be insufficient. Thus, international organizations such as the Asian Development Bank, UNEP, and UNDP may need to play a catalytic role and supply financing.

Startup hurdles generally will be the lowest for dominant actor regimes. This obviously will be the case when only a single jurisdiction or firm has sufficient market power and incentives to act. Organization costs will be greater when several actors have to cooperate in order to exercise sufficient market power to leverage responsive action by other jurisdictions or firm. More substantial organizational costs will arise if firms or other jurisdictions seek to develop a coordinated response to regulatory initiatives by a market dominant actor by, for example, establishing a rival regulatory club, although existing transnational organizations, such as ICAO in the case of airline emissions or an international trade association may afford an institutional base.

C. Mechanisms for Monitoring Performance by Building Block Regimes and Participants

Each building block regime must include arrangements to monitor the performance of the members of a regime. The approach will vary depending on the building block strategy that the regime embodies, the members of a club, those subject to regulation by a regulatory regime, development assistance donors and recipients, and others whose actions must be aligned to secure the regime objectives. Arrangements must be made to monitoring the performance of the regime itself in securing its objectives in order to ensure continued participation and support. Member and regime performance monitoring might be extended, as discussed further below, to include reductions in greenhouse gas emissions achieved.

Obtaining this information is necessary to determine whether the regime is performing effectively and what the appropriate corrective steps might be when it is not. Actions required of members can include, for example, compliance with regulatory norms, financial contributions, and the use of regime resources for agreed purposes and reporting. In cases of member non-compliance, the regime may impose sanctions, including exclusion from the regime. The arrangements for monitoring will depend on the regime's size and function. In a regime with only two or three members and a very specific purpose, monitoring arrangements may be highly informal. Such arrangements necessary will be more elaborate and highly institutionalized in a regime with many members and a complex array of undertakings.

A basic distinction must be made between "internal transparency" under which the information from monitoring is made available to the regime management and members, and "external transparency" when it is disclosed to others, including in some cases to the public generally. In some club regimes, such as joint research and development regimes, much information will be restricted to insiders because of its proprietary character or other advantages that competitors that are not club members would reap were it disclosed. Where innovations are protected by intellectual property rights, in clubs aimed at trade liberalization, and in regulatory regimes, external transparency may further the club's objectives. Some programs may involve legally binding regulatory requirements, such as limitations on ozone-depleting substances and HFCs, in which case, information systems would track regulatory compliance. In other cases, regulatory norms will likely not be legally binding, such as those for energy efficiency in aluminum production, or harmonization of technical standards for energy-efficient goods and services. But monitoring and reporting member performance though uniform methods will be important not only to ensure compliance with regime obligations but also to promote joint learning about new and better ways to achieve resource efficiency or other regime objectives.

The metrics for measuring participant performance will vary depending on the activity covered by the regime and its regulatory norms, but should be structured to measure not only progress to agreed-upon regime goals (e.g., aggregate reductions in energy usage in aluminum production; increased trade in efficient or low-emissions products and services; aggregate reductions in regional non-carbon dioxide air pollutants), but also, as discussed below, resulting reductions in greenhouse gas emissions.. To the extent that economic and other private benefits can be revealed and tracked, this may help to cement and expand regime participation.

In some types of regime, such as those for setting standards, protocols, and certification mechanisms for measuring energy efficiency and greenhouse gas emissions, wide eternal transparency is vital for achieving the regimes' objectives. Global administrative law principles and practices of transparency, participation, reason giving and review may help strengthen the regime's effectiveness and outside constituencies' support it.[92] Regulatory regimes developed through linkage and dominant actor regimes generally will benefit from substantial external transparency. Development assistance and finance programs also will benefit for external transparency, because these programs must track donor contributions and how recipient countries are using the funds. Such information systems could benefit from substantial NGO involvement.

[92] Benedict Kingsbury, Nico Krisch & Richard B. Stewart, *The Emergence of Global Administrative Law*, 68 LAW & CONTEMP. PROBS. 15 (2005).

D. A Greenhouse Gas Performance Reporting Network for Building Block Regimes

Different building block regimes might be developed by different sets of actors in a totally uncoordinated fashion. Myriad decentralized efforts will tap diverse sources of innovation and initiative. In the aggregate, the regimes would be making significant progress toward reducing greenhouse gas emissions at lower cost and building bonds of trust that would pave the way for developing a greenhouse gas emissions treaty. There would, however, be additional benefits from higher-level institutional arrangements. Such arrangements would promote coordination and mutual learning among the different building block regimes, enabling them to improve their performance in meeting their objectives and thereby also increasing their contribution to climate protection.

It would not be consistent with the building block approach to establish and an overarching treaty-based or other body with authority to supervise and orchestrate the several disparate regimes. A looser and more productive form of coordination may be achieved through the emergence of informational networks in specific sectors, such as sustainable forestry, grid efficiency, renewable energy deployment, or urban transportation. These sector-based networks could develop standardized monitoring and reporting protocols for the performance of the regimes within the network and disseminate the information to regime members. This information could include, to the extent feasible and appropriate, performance in reducing greenhouse gas emissions.

These sector-based information networks would promote mutual learning among different regimes and their participants in the same sector or program area—for example, grid efficiency – furthering innovation and promoting diffusion of best practices through experimentalist techniques and benchmarking. The prospect of private benefits from mutual learning would often be an incentive for regimes to participate in such a sector-based network. A trade association or other global institution may need to take the lead in organizing and supporting such networks in specific sectors.

We also contemplate, as a further part of the building block strategy, an umbrella informational network for reporting the greenhouse gas emissions reductions achieved by the different regimes in various sectors. The umbrella network would develop monitoring, reporting, and verification protocols that would be adopted by the various sector-based networks and their members. As discussed below, this information could be integrated into the UNFCCC emissions reporting system. Developing sufficiently inclusive monitoring, reporting and verification protocols that accommodate considerable differences in different sectors and regimes while still ensuring that the informational outputs are reliable and enable cross-regime comparisons will be challenging. The gains, however, would be substantial. The Greenhouse Gas Protocol and other greenhouse gas emissions monitoring, reporting, certification, and labeling clubs have already made substantial progress on the tasks involved.[93]

Incentives for participating in greenhouse gas emissions monitoring and reporting would vary between regime types. Regimes where the objective is to reduce greenhouse gas emissions[94] must track emissions reductions for the regime to function. Participants in regimes (by far the more numerous) with goals other than reducing GHG would often have substantial incentives to report their GHG performance. Doing so would reap reputational benefits, potential regulatory recognition, and credit

[93] Jessica F. Green, *The Greenhouse Gas Protocol: A Case of Private Entrepreneurial Authority* (APSA 2009 Toronto Meeting Paper, Oct. 5, 2009), *available at* http://ssrn.com/abstract=1450434.
[94] For example, reducing methane (a greenhouse gas) emissions in hydrofracking for health and safety reasons.

for reductions achieved. Obtaining these benefits will require credible monitoring, reporting, and verification, satisfying the expectations of regulators, environmental constituencies, socially responsible investors, and the public. In many regimes with performance objectives, such as improving energy efficiency or deploying renewable energy, the success of the regime can be easily converted into greenhouse gas emissions metrics. In other cases, measuring the greenhouse gas reductions may not be feasible. This could arise, for example in the early stages of joint research and development or in developing assistance for climate sustainable urban development. Furthermore, in some cases, such as research and development clubs, external transparency could compromise the regime's ability to provide club benefits to members and thus would be unable to function effectively

The umbrella greenhouse gas performance information network that we contemplate would most likely be a hybrid organization, composed of representatives of building block regimes and key sponsors, such as IFIs, UN agencies, MEF countries, and representatives of international standard setting organizations, global NGO coalitions, and international trade associations.[95] MEF countries and IFIs would have to take the lead in organizing the network and underwriting its operating costs. The number of participating building block regimes would be small at the outset but could grow as the network develops. Indeed, there might initially be several networks in different fields or sectors that could eventually be merged. The information on greenhouse gas performance generated through the network would allow for comparative evaluation and ranking through indicators of the performance of different regimes. Indicators would stimulate and facilitate improved performance by regimes and induce additional regimes, as they emerge, to join the informational network.[96] The information generated by the network would also enable the overall contributions of the building block regimes to climate mitigation to be established.

E. Linking Building Block Greenhouse Gas Performance Measures to the UNFCCC Reporting System

We also contemplate, that the greenhouse gas performance achieved by various building block regimes, reported in accordance with the MRV protocols established by an umbrella greenhouse gas performance network, would be included within the UNFCCC reporting systems. At present, these reports consist exclusively of information provided by countries regarding their greenhouse gas emissions and steps taken to limit those emissions. The reports of building block GHG performance could form a separate, additional part of the UNFCCC reporting system, orthogonal to the existing country system reports, tracking the limitations achieved by the sectoral regimes and their members, including subnational jurisdictions and non-state actors. At the same time, country UNFCCC reports could draw on the methodologies and information generated by these building block regimes and engage building block experts in UNFCCC monitoring, reporting, and verification design and review of reports. The methodological work and informational output of the building block greenhouse gas

[95] Giving the task initially to a UNFCCC body would be undesirable. A separate institution has the ability to involve directly subnational and private sector actors that have little role within the state-centered UNFCCC. Mobilizing these actors to take actions that will reduce greenhouse gas emissions is a central objective of the building block approach. Accordingly, subnational and private sector actors should play major roles in an umbrella greenhouse gas information network. Recognizing reductions achieved by subnational jurisdictions is important because, as exemplified in the U.S. case, a lack of a national policy inhibits effective actions via the UNFCCC. Furthermore, engaging other treaty regimes, including the Convention on Long-range Transboundary Air Pollution and the Montreal Protocol, to achieve additional emissions reductions might occur more easily via a non-UNFCCC institution.

[96] KEVIN DAVIS ET AL., GOVERNANCE BY INDICATORS (Angelina Fisher et al., eds., 2012).

performance network could thereby support and stimulate the development of improved and more consistent UNFCCC country reports and expand the information available on GHG reduction progress by including data on performance by sectors as well as by countries.[97]

There are a number of reasons to think that either a formal or an informal link between building block regimes' reports and UNFCCC reporting would be workable and beneficial. First, there are strong incentives for developed and developing countries, firms, and other entities participating in building block regimes to support linking. Doing so would allow them to claim credit in the UNFCCC for the reductions achieved by those regimes. The UNCCCC Secretariat, the reporting regime, and expert communities also would likely support linking. Involving building block monitoring, reporting, and verification experts would increase the accuracy of country reports, and where included in expert review teams, could provide increased monitoring ability and decrease resource demands on the UNFCCC.

Finally, linkage could serve larger political purposes. Some, including some developing countries, may criticize a building block approach as an alternative with less inclusive and less ambitious targets than that of the UNFCCC. Many developing countries already criticize bilateral and plurilateral greenhouse gas reduction initiatives as a means for developed countries to avoid their responsibilities for causing climate change; to avoid their UNFCCC mitigation responsibilities; and to avoid their obligation to engage with developing countries in decisions and actions that affect them. Linking building block regimes to the UNFCCC process, in a way that respects the need for multilateralism in addressing the global character and consequences of climate change, may help defuse these criticisms and meet developing country concerns.

Linkage will, however, raise a number of problems that will need to be addressed. Such problems include differences in the reporting requirements and standards both among the building block regimes and between the regimes and the UNFCCC requirements. Differences likely will include reporting coverage (e.g., state actions only, wholly private actions, or NGO actions); categories (e.g., mitigation actions, policies, and programs); accounting rules (e.g., base years, Land Use, Land-Use Change, and Forestry (LULUCF) protocols, allocation of international offset credits and other forms of climate finance); allocating greenhouse gas emissions and reductions reported by transnational regimes (e.g., either directly to members of a regime or through their non-state actors); and ensuring general monitoring, reporting, and verification program quality.

These difficulties could be ameliorated by well-designed building block reporting requirements that draw upon the greenhouse gas UNFCCC reporting requirements. However, many building block programs likely would be uniform for all participants, including both developed and developing countries and their firms, while the UNFCCC will likely have separate requirements for developed and developing countries.

[97] *See* Jennifer Morgan et al, *Reflections on COP 17 in Durban*, WORLD RES. INST. (Dec. 16, 2011), http://insights.wri.org/news/2011/12/reflections-cop-17-durban. The recently adopted UNFCCC international consultations and analysis (ICA) and international assessment and review (IAR) reporting regimes have considerable weaknesses, including limited potential for engaging experts and non-state actors in the reporting and review process and also the insufficiency and lack of comparability of state report data.

VII. Conclusion

The character of climate protection as a global public good creates formidable obstacles to reaching agreement on a binding treaty that includes all major emitting countries, developing as well as developed; that imposes binding commitments to significant reductions; and has effective compliance arrangements. These obstacles, reflected in the low-ambition Durban Platform and the absence of any significant international regulation until at least 2020, requires a new and quite different approach for reducing greenhouse gas emissions. The approach must reach beyond the UNFCCC state-centered lawyer-diplomat process. An array of regimes, developed in accordance with the three building block designs for sector-specific transnational cooperation set forth in this article, can enlist the incentives and energies of a wide array of actors, including all levels of government, international organizations, firms, and NGOs to take innovative actions that will have the effect, if not in many cases the purpose, of reducing emissions. In this way, the building block approach can bypass the political blockages and leadership failures in the governments of the biggest emitting countries. The approach can make progress in reducing greenhouse gas emissions and in building networks of trust. These initiates can contribute to changes in political and economic conditions and outlooks and build transnational and domestic constituencies and cooperation in ways that will make an effective international climate treaty more achievable.

Creating and developing building block regimes will require leadership by public and private policy entrepreneurs and institutional innovators to support initiatives that further existing institutional missions while will also reducing greenhouse gas emissions. Such tasks must be taken together with key actors and constituencies in existing international and domestic institutions. Researchers and analysts can make important contributions to this effort by canvassing opportunities for deployment of the three building block strategies, analyzing the incentives of key actors and organizations, and providing ideas and analysis for designing institutional arrangements to mobilize those incentives in the service of climate protection. A clearheaded focus on incentives, political economy, and institutional design in the specific context of each potential new building block regime will be essential to success.